

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re **PATENT** application of:

Applicants: Donald Ray Denton et al.

Application No.: 09/829,714

For: FILTER ELEMENT AND METHOD OF MAKING SAME

Filing Date: April 10, 2001

Examiner: Terry K. Cecil

Art Unit: 1723

Confirmation No.: 1788

**AMENDED APPEAL BRIEF**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This brief is being submitted in connection with the appeal of the above-identified application.

**I. REAL PARTY IN INTEREST**

The real party in interest in the present appeal is Parker Hannifin Corporation, the assignee of the present application.

**II. RELATED APPEALS AND INTERFERENCES**

Appellants, Appellants' undersigned representative, and/or the assignee of the present application are unaware of any prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

### **III. STATUS OF CLAIMS**

Claims 66-77 and 79-87 are pending in the application, stand finally rejected, and are the subject of this appeal. Claims 1-65 and 78 are cancelled. A clean listing of the claims is attached in the CLAIMS APPENDIX.

### **IV. STATUS OF AMENDMENTS**

There were no after-final amendments.

### **V. SUMMARY OF CLAIMED SUBJECT MATTER**

Claim 66 recites a filter element 10 comprising a cylindrical filter media and an exoskeleton for the filter media. The filter media 14 is formed from only cellulose-fiber-free and woven-mesh-free layers 36/38/40. The filter media layers 36/38/40 are folded to form a plurality of longitudinally-extending pleats 24/26 having radially inner-peaks 30 defining an inner diameter and radially-outer peaks 32 defining an outer diameter. The exoskeleton comprises a support screen 16 thermally bonded to the radially-outer peaks 32 of the filter media 14, providing an at least 50% open flow area, and providing a tight array of attachment points supporting the pleats 24/26 in an appropriately spaced and non-collapsed condition. The support screen 16 comprises a sheet of screen material 80 having a width approximately equal to the axial dimension of the filter media 14. The filter element 10 is characterized by the absence of cellulose-fiber and woven-mesh endoskeleton support layers in the filter media 14 and by the absence of a support structure surrounding the support screen 16. (Figures 1, 2, 3 and 3A.)

Claim 80 recites a filter element 10 consisting essentially of a cylindrical filter media 14, a support screen 16, and an end cap 18/20 bonded to each axial end of the filter media 14. The filter media 14 is formed from cellulose-fiber-free and woven-mesh-free layers 36/38/40 which are folded to form a plurality of longitudinally-extending pleats 24/26 having radially inner-peaks 30 defining an inner diameter and radially-outer peaks 32 defining an outer diameter. The support screen 16 has a width approximately

equal to the axial dimension of the filter media 14 and is thermally bonded to the radially-outer peaks 32 of the filter media 14. (Figures 1, 2, 3 and 3A.)

Claim 84 recites a filter element 10 consisting essentially of a cylindrical filter media 14, a support screen 16, an end cap 18/20 is bonded to each axial end of the filter media 14 and a central tube 12 is circumscribed by the filter media 14. The filter media 14 is formed from cellulose-fiber-free and woven-mesh-free layers 36/38/40. The layers are folded to form a plurality of longitudinally-extending pleats 24/26 having radially inner-peaks 30 defining an inner diameter and radially-outer peaks 32 defining an outer diameter. A support screen 16 is provided, which has a width approximately equal to the axial dimension of the filter media 14 and is thermally bonded to the radially-outer peaks 32 of the filter media 14. (Figures 1, 2, 3 and 3A.)

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

- 1. The rejection of claims 66-75, 77 and 79-87 under 35 U.S.C. § 103(a) over US 3516549 to MacDonnell in view of US 3506475 to MacDonnell and US 6165572 to Kahlbaugh and US 5552048 to Miller.**
- 2. The rejection of claims 76 under 35 U.S.C. § 103(a) over US 3516549 to MacDonnell in view of US 3506475 to MacDonnell and US 6165572 to Kahlbaugh and US 5552048 to Miller, and in further view of US 6331223 to Wylie.**

## **VII. ARGUMENT**

The claims on appeal are directed towards a filter element for use in a filter assembly which removes impurities in aviation jet fuel handling systems. Such a filter assembly, known in the industry as an aviation fuel microfilter, has a cylindrical filter media constructed to continuously remove dirt of a minimum particle size (about 0.5  $\mu\text{m}$  to about 25.0  $\mu\text{m}$ ) from the aviation fuel. The Institute of Petroleum has published recommended minimum performance and mechanical specifications for aviation jet fuel

microfilters. These specifications include contaminant removal efficiency (e.g., less than 0.15 mg/l particles greater in size than the stated filter rating and maintained up to a differential pressure of 1.5 bar), media migration (e.g., less than 10 fibers per liter), flow rate (e.g., 10 liters/second per meter of effective media length), differential pressure (e.g., at qualification flow rate with clean, dry fuel), and structural strength (e.g., capable of withstanding a differential pressure of 5 bar (72.5 psi) without element rupture or bypassing of seals). The microfilter specifications have been reviewed and accepted by the major aviation fuel companies and microfilter manufactures are expected to satisfy the specifications.

Appellant's filter element can be constructed to not only meet the recommended microfilter specifications of the Institute of Petroleum, but to also have a longer life and higher efficiency than conventional aviation fuel microfilters satisfying these specifications. Specifically, for example, the filter element has a unique exoskeleton which eliminates the need for endoskeleton support layers (i.e., cellulose-fiber or woven-mesh layers) without requiring additional exoskeleton support structures. The exoskeleton comprises a support screen 16 having a width approximately equal to the axial dimension of the filter media 14 and thermally bonded to the radially-outer peaks of the filter media 14. (See Figure 1, below.)

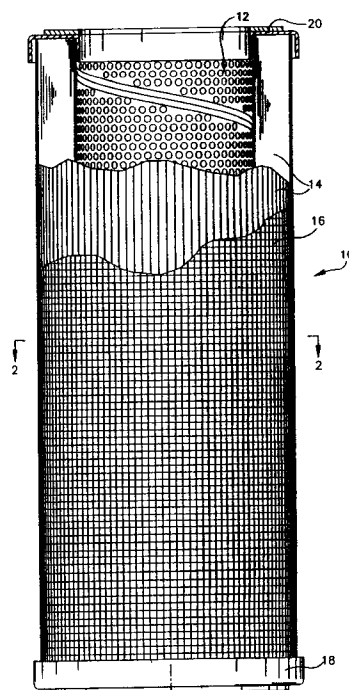
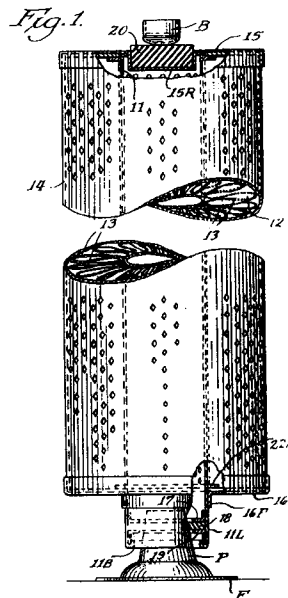


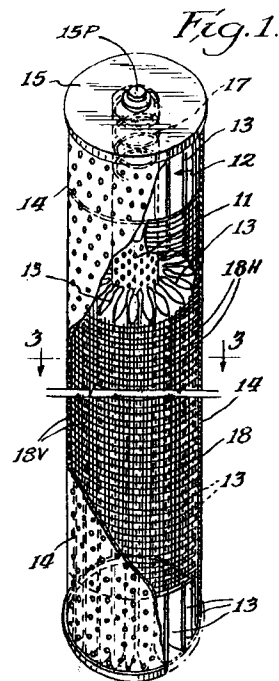
Figure 1

US 3516549 to MacDonnell discloses a filter (having a pleated paper medium) “intended particularly for use in the engine lubrication systems of [railroad] diesel locomotives.”<sup>1</sup> According to MacDonnell, “[l]ocomotive filter applications encounter extreme operating conditions including high system pressures and flows and startup surges.”<sup>2</sup> In this filter, an outer cover wrap 14 encircles the pleated filter element 12 and extends “the full length to seat in upper and lower end caps 15 and 16.”<sup>3</sup> The outer cover wrap 14 appears to have a scattering of diamond-shaped perforations forming fluid passages therethrough. (See Figure 1, below.)



1. Column 2, lines 23 - 26.
2. Column 1, lines 32 - 35.
3. Column 2, lines 43 - 46.

US 3506475 to MacDonnell discloses a filter element 12 (also for high pressure locomotive lubrication systems) comprising a pleated filter media, a netting 18, and an outer cover wrap 14. MacDonnell describes the netting 18 as “extending in encircling relaxed about the outer peaks 13P of the pleat” and as having “a vertical dimension corresponding to about 75% of the length of height of the filter element.”<sup>4</sup> The outer cover wrap 14 appears to be identical to the outer cover wrap 14 disclosed in US3516549 to MacDonnell and, in any event, it surrounds the netting 18 and seats in the upper and lower end caps 15 and 16. (See Figure 1, below.)



The MacDonnell netting 18 is provided to address the problem of pleat collapsing that can be caused by a cold oil surge (e.g., engine startup). Apparently, the collected deposits on pleat faces can cause a collapsed pleat to stick or cake on the next adjacent pleat so that the collapse becomes permanent. The netting 18 functions as a “tension transmitting structure for ganging the pleats” which essentially causes the

4. For example, for a 30 inch long filter element, the netting may be 22 inches long and centered with respect to the ends of the filter element.

pleats to collapse in a group.<sup>5</sup> The netting 18 is attached to the filter media when “adhesive is appropriately applied along the lengths of the outer peaks.”

The Examiner contends that it would have been obvious to “have the bonded exoskeleton support screen of MacDonnell ‘475 for the exoskeleton of MacDonnell ‘549, since ‘475 teaches the benefit of ganging the pleats to cause a flexing action preventing a permanent pleat collapse.”<sup>6</sup>

It is respectfully submitted that the applied art does not support the Examiner’s proposed combination. If one of ordinary skill wanted to reap the benefits of “pleat-ganging”, he/she would use the netting 18 in combination with the MacDonnell outer wrap 14. The applied prior art does not show the use of such netting 18 without an outer wrap.

The Examiner does not find this line of reasoning convincing because “the netting does provide support to the pleated filter material” and, thanks to the netting, “operating pressures of 125 psi rather than the conventional 60 psi are possible before a bypassing condition is necessary.” Be this as it may, the support provided by the MacDonnell netting 18 is provided in combination with its outer wrap 14 and the increased operating pressure is achieved with both the netting 18 and the outer wrap 14.

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5. With the MacDonnell netting 18, adjacent pleats are connected in a mechanically ganged relationship so that the circumferential flexing of any one pleat involves the circumferential flexing of a plurality of successively adjacent pleats. The stored energy is collectively applied through the netting 18 to effect positive return movement of the collapsed pleat in spite of any tendency to stick. (Moreover, each time a pleat flexes, any deposit building up on that pleat ends to fracture and drop off so that the flexing action continually tends to maintain the filter surfaces at their desired original permeability.) Significantly, MacDonnell expressly notes that “previous approaches have been directed at stabilizing the position of the pleats whereas in the present arrangement, the tendency to flex is freely permitted and is utilized to achieve improve filter performance.”

6. US 6165572 to Kahlbaugh is used by the Examiner to show “cellulose-fiber-free and woven-mesh-free layers” filter layers. US 5552048 to Miller is used to by the Examiner to show seam allowance, heat-bonding to filter pleats, and grid size.

The Examiner additionally relies on the fact that the independent claim of the MacDonnell '475 patent does not specifically recite a wrap. It is respectfully submitted that while claim-coverage might be relevant when evaluating infringement issues, it is not dispositive of the present patentability issues. The telegraph/facsimile comparison is a classic example of this concept. While the claims of a patent covering the telegraph invention would probably read on the facsimile invention, this certainly does not mean that the facsimile is not a patentable improvement of the telegraph.

Moreover, even if the Examiner's proposed combination were made in hindsight, it would not result in a support screen (and/or a sheet of screen material) having a width approximately equal to the axial dimension of the filter media. As was explained above, the MacDonnell netting 18 has "a vertical dimension corresponding to about 75% of the length of height of the filter element."

The Examiner further points out that filter elements are sub-combinations intended to be used in combination with filter housing constructions whereby structural elements that are part of the housing could also provided support for the filter elements. However, these parts of the housing would not be part of an intended-to-be-replaced filter element, which US 3516549 to MacDonnell, for example, defines as a "replaceable cartridge."

With particular reference to independent claims 80 and 84, they specify that the filter element consist essentially of the recited features. The Examiner asserts that the "consisting essentially of" transitional phrase is construed to be synonymous with "comprising" and thus does not preclude the existence of a second outer filter support. It is respectfully submitted that the transitional phrase "consisting essentially of" limits the scope of a claim to the specified features "and those that do not materially affect the basic and novel characteristics" of the claimed invention.<sup>7</sup> In the present case, a second outer filter support would not categorized as an immaterial feature.<sup>8</sup>

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7. MPEP 2111.03.

8. The Examiner noted in the final Office Action that, since the specification includes embodiments with or without the core, claim 80 does not preclude the



For these reasons, US 3516549 to MacDonnell and/or US 3506475 to MacDonnell are not believed to show or suggest the filter elements set forth in claims 66-75, 77 and 79-87. US 6165572 to Kahlbaugh and US 5552048 to Miller do not cure the shortcomings of the MacDonnell references.

**2. The rejection of claims 76 under 35 U.S.C. § 103(a) over US 3516549 to MacDonnell in view of US 3506475 to MacDonnell and US 6165572 to Kahlbaugh and US 5552048 to Miller, and in further view of US 6331223 to Wylie.**

Claim 76 has been rejected as being obvious over US 3516549 to MacDonnell in view of US 3506475 to MacDonnell and US 6165572 to Kahlbaugh and US 5552048 to Miller, and in further view of US 6331223 to Wylie.<sup>9</sup>

For the same reasons cited above with respect to the rejection of claims 66-75, 77 and 79-87, US 3516549 to MacDonnell and/or US 3506475 to MacDonnell are not believed to show or suggest the filter elements set forth claim 76. US 6165572 to Kahlbaugh and US 5552048 to Miller, and US 6331223 to Wylie, do not cure the shortcomings of the MacDonnell references.

## **CONCLUSION**

In view of the foregoing, appellant respectfully submits that the claims are patentable over the applied art and that the final rejection should be reversed.<sup>10</sup>

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additional structure of a central tube therewith. Be this as it may, a second outer filter support would not be categorized as an immaterial feature.

9. The Examiner relies on US 6331223 as showing a screen material made of PVC coated fiberglass.

10. Should a petition for an Extension of Time be necessary for the timely filing of this brief (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988, Order No. PARKP0148US.

**VIII. CLAIMS APPENDIX**

Attached hereto.

**IX. EVIDENCE APPENDIX**

An Evidence Appendix is attached, but identifies no evidence.

**X. RELATED PROCEEDINGS APPENDIX**

A Related Proceedings Appendix is attached, but identifies no proceedings.

Respectfully submitted,

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/Cynthia S. Murphy/

Cynthia S. Murphy

April 2, 2007

Date

## **VIII. CLAIMS APPENDIX**

66. A filter element comprising a cylindrical filter media and an exoskeleton for the filter media;

the filter media being formed from only cellulose-fiber-free and woven-mesh-free layers which are folded to form a plurality of longitudinally-extending pleats having radially inner-peaks defining an inner diameter and radially-outer peaks defining an outer diameter;

the exoskeleton comprising a support screen thermally bonded to the radially-outer peaks of the filter media, providing an at least 50% open flow area, and providing a tight array of attachment points supporting the pleats in an appropriately spaced and non-collapsed condition;

the support screen comprising a sheet of screen material having a width approximately equal to the axial dimension of the filter media;

the filter element being characterized by the absence of cellulose-fiber and woven-mesh endoskeleton support layers in the filter media and by the absence of a support structure surrounding the support screen.

67. A filter element as set forth in claim 66, wherein the layers comprise an inner layer, an outer layer, and a filtration layer therebetween; and wherein the filter media has a density of about 8 or more pleats per inner diameter inch.

68. A filter element as set forth in claim 67, wherein the layers of the filter media consist essentially of the inner layer, the outer layer, the filtration layer.

69. A filter element as set forth in claim 67, wherein the inner layer is made of a non-woven polymer, the outer layer is made of a non-woven polymer, and the filtration layer is made of fiberglass or at least one polymer.

70. A filter element as set forth in claim 67, wherein the inner and outer layers each have a thickness of less than about 0.030 inches.

71. A filter element as set forth in claim 66, wherein the layers of the filter media consist essentially of an inner layer, an outer layer, and a filtration layer therebetween; and wherein the filtration layer is made of at least one of fiberglass, nylon, polyamide, polyester, polyethylene, polypropylene, or mixtures thereof, and wherein the inner and outer layers each have a thickness less than about 0.030 inches and are made of a non-woven polymer.

72. A filter element as set forth in claim 66, wherein support screen comprises a first set of cords extending in a first direction, a second set of cords extending in a second direction and intersecting with the first set of cords, and openings defined therebetween;

wherein adjacent cords in the first set are separated from each other by a distance  $d_1$ , adjacent cords in the second set are separated from each other by a distance  $d_2$ , and adjacent radially-outer peaks are separated from each other by a distance  $d_{\text{pleat}}$ ; and

wherein the distance  $d_1$  between the first set of cords is about half to about twice the distance  $d_{\text{pleat}}$  between adjacent radially-outer peaks.

73. A filter element as set forth in claim 66, wherein the sheet of screen material has a length approximately equal to the circumferential dimension of the filter media plus a seam allowance and the support screen has lateral edges joined together at a side seam.

74. A filter element as set forth in claim 73, wherein the side seam extends substantially parallel to a longitudinal axis of the filter media.

75. A filter element as set forth in claim 73, wherein the lateral edges overlap and are thermally bonded together to form the side seam.

76. A filter element as set forth in claim 66, wherein the support screen is made of a PVC coated fiberglass mesh.

77. A filter element as set forth in claim 66, wherein the filter element is a microfilter element for removing impurities in the range of about 0.5  $\mu\text{m}$  to about 25.0  $\mu\text{m}$  from hydrocarbon fuel.

79. A filter element as set forth in claim 66, wherein the filter media is a coalescer element for removing free water and particulate from aviation fuel.

80. A filter element consisting essentially of:  
a cylindrical filter media formed from cellulose-fiber-free and woven-mesh-free layers which are folded to form a plurality of longitudinally-extending pleats having radially inner-peaks defining an inner diameter and radially-outer peaks defining an outer diameter;  
a support screen having a width approximately equal to the axial dimension of the filter media; and thermally bonded to the radially-outer peaks of the filter media;  
and  
an end cap bonded to each axial end of the filter media.

81. A filter element as set forth in claim 80 wherein the support screen provides an at least 50% open flow area and a tight array of attachment points supporting the pleats in an appropriately spaced and non-collapsed.

82. A filter element as set forth in claim 80, wherein the filter element is a microfilter element for removing impurities in the range of about 0.5  $\mu\text{m}$  to about 25.0  $\mu\text{m}$  from hydrocarbon fuel.

83. A filter element as set forth in claim 80, wherein the layers of the filter media consist essentially of an inner layer, an outer layer, and a filtration layer therebetween; and wherein the filtration layer is made of at least one of fiberglass, nylon, polyamide, polyester, polyethylene, polypropylene, or mixtures thereof, and wherein the inner and outer layers each have a thickness less than about 0.030 inches and are made of a non-woven polymer.

84. A filter element consisting essentially of:

a cylindrical filter media formed from cellulose-fiber-free and woven-mesh-free layers which are folded to form a plurality of longitudinally-extending pleats having radially inner-peaks defining an inner diameter and radially-outer peaks defining an outer diameter;

a support screen having a width approximately equal to the axial dimension of the filter media; and thermally bonded to the radially-outer peaks of the filter media;

an end cap bonded to each axial end of the filter media; and

a central tube circumscribed by the filter media.

85. A filter element as set forth in claim 84 wherein the support screen provides an at least 50% open flow area and a tight array of attachment points supporting the pleats in an appropriately spaced and non-collapsed.

86. A filter element as set forth in claim 84, wherein the filter element is a microfilter element for removing impurities in the range of about 0.5  $\mu\text{m}$  to about 25.0  $\mu\text{m}$  from hydrocarbon fuel.

87. A filter element as set forth in claim 84, wherein the layers of the filter media consist essentially of an inner layer, an outer layer, and a filtration layer therebetween; and wherein the filtration layer is made of at least one of fiberglass, nylon, polyamide, polyester, polyethylene, polypropylene, or mixtures thereof, and wherein the inner and outer layers each have a thickness less than about 0.030 inches and are made of a non-woven polymer.

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**IX. EVIDENCE APPENDIX**

None.

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**X. RELATED PROCEEDINGS APPENDIX**

None.

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